

Appl. No. 10/817,412
Amdt. dated June 21, 2005
Reply to Office action of May 26, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and
listing, of claims in the application:

Listing of Claims:

1 Claim 1 (original): A TM microstrip antenna mounted on a
2 projectile comprising:

3 (a) a first rectangular shaped dielectric layer;

4 (b) a plurality of rectangular shaped antenna elements
5 mounted on an upper surface of said first dielectric layer, said
6 antenna elements being aligned with one another and fabricated
7 from copper, said antenna elements being adapted to transmit
8 telemetry data at a frequency of approximately 2.25 GHz;

9 (c) an antenna feed network mounted on a bottom surface of
10 said first dielectric layer, said antenna feed network having a
11 main transmission line connected to a signal input for said TM
12 microstrip antenna, said feed network having a plurality of
13 branch transmission lines connected to said main transmission
14 line and each of said antenna elements, each of said branch
15 transmission lines including a plurality of probes, one of said

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16 probes being positioned underneath one antenna element of said
17 plurality of antenna elements to capacitively couple said one
18 antenna element to said feed network, resulting in a linear
19 polarization and an omni-directional radiation pattern being
20 generated by said antenna elements of said TM microstrip antenna;
21 and

22 (d) a pair of identical filters integrally formed within
23 said main transmission line, each of said pair of identical
24 filters being tuned at a GPS frequency of approximately 1.575 GHz
25 to provide for a minimum isolation of 50 dB.

1 Claim 2 (original): The TM microstrip antenna of claim 1
2 further comprising a continuous gap formed around first, second,
3 third and fourth sides of each of said antenna elements, said
4 continuous gap for each of said antenna elements having an
5 electric field generated by said antenna element confined to said
6 continuous gap.

1 Claim 3 (original): The TM microstrip antenna of claim 2
2 further comprising a copper plated ground mounted on a remaining
3 portion of the upper surface of said first dielectric layer
4 around the continuous gap for each of said antenna elements.

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1 Claim 4 (original): The TM microstrip antenna of claim 3
2 further comprising a second dielectric layer positioned below
3 said first dielectric layer in alignment with said first
4 dielectric layer, said second dielectric having a ground plane
5 mounted on a bottom surface thereof.

1 Claim 5 (original): The TM microstrip antenna of claim 4
2 wherein said copper plated ground mounted on the upper surface of
3 said first dielectric layer is connected to the ground plane
4 mounted on the bottom surface of said second dielectric layer by
5 a plurality of vias which pass from said copper plated ground
6 through said first dielectric layer and said second dielectric
7 layer to said ground plane.

1 Claim 6 (original): The TM microstrip antenna of claim 1
2 wherein said pair of identical filters each comprise a 5-Section
3 Band Stop Filter.

1 Claim 7 (original): The TM microstrip antenna of claim 1
2 wherein each of said antenna elements includes a tuning stubs
3 located on one side of said antenna element, said tuning stub for

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4 each of said antenna element allowing said antenna element to be
5 fine tuned to an operating frequency for said TM microstrip
6 antenna.

1 Claim 8 (original): The TM microstrip antenna of claim 1
2 wherein said signal input for said feed network comprises a fifty
3 ohm signal input for said feed network.

4 Claim 9 (currently amended): The TM microstrip antenna of
5 claim 4 wherein said first dielectric layer comprises a circuit
6 board and said second dielectric layer comprises a ground board,
7 said circuit board and said ground board each having an overall
8 dimension of 5.7 inches in width and approximately 27 inches in
9 length.

1 Claim 10 (original): A TM microstrip antenna mounted on a
2 projectile comprising:

3 (a) a first rectangular shaped dielectric layer;

4 (b) a plurality of rectangular shaped antenna elements
5 mounted on an upper surface of said first dielectric layer, said
6 plurality of antenna elements being aligned with one another and
7 fabricated from copper, said plurality of antenna elements being

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8 adapted to transmit telemetry data at a frequency of
9 approximately 2.25 GHz;

10 (c) each of said plurality of antenna elements including a
11 tuning stub located on one side of said antenna element, said
12 tuning stub for each of said plurality of antenna elements
13 allowing said plurality of antenna elements to be fine tuned to
14 an operating frequency for said TM microstrip antenna;

15 (d) an antenna feed network mounted on a bottom surface of
16 said first dielectric layer, said antenna feed network having a
17 main transmission line connected to a signal input for said TM
18 microstrip antenna, said feed network having a plurality of
19 branch transmission lines connected to said main transmission
20 line and each of said antenna elements, each of said branch
21 transmission lines including a plurality of probes, one of said
22 probes being positioned underneath one antenna element of said
23 plurality of antenna elements to capacitively couple said one
24 antenna element to said feed network, resulting in a linear
25 polarization and an omni-directional radiation pattern being
26 generated by said antenna elements of said TM microstrip antenna;

27 (e) a pair of identical filters integrally formed within
28 said main transmission line, each of said pair of identical
29 filters being tuned at a GPS frequency of approximately 1.575 GHz

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30 to provide for a minimum isolation of 50 dB, each of said pair of
31 filters comprising a band stop filter; and

32 (h) a second dielectric layer positioned below said first
33 dielectric layer in alignment with said first dielectric layer,
34 said second dielectric layer having a ground plane mounted on a
35 bottom surface thereof.

1 Claim 11 (original): The TM microstrip antenna of claim 10
2 further comprising a continuous gap formed around first, second,
3 third and fourth sides of each of said plurality of antenna
4 elements, said continuous gap for each of said plurality of
5 antenna elements having an electric field generated by said
6 antenna element confined to said continuous gap.

1 Claim 12 (original): The TM microstrip antenna of claim 11
2 further comprising a copper plated ground mounted on a remaining
3 portion of the upper surface of said first dielectric layer
4 around the continuous gap for each of said plurality of antenna
5 elements.

1 Claim 13 (original): The TM microstrip antenna of claim 12
2 wherein said copper plated ground mounted on the upper surface of

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3 said first dielectric layer is connected to the ground plane
4 mounted on the bottom surface of said second dielectric layer by
5 a plurality of vias which pass from said copper plated ground
6 through said first dielectric layer and said second dielectric
7 layer to said ground plane.

1 Claim 14 (original): The TM microstrip antenna of claim 10
2 wherein said band stop filter for each of said pair of identical
3 filters comprises a 5-Section Band Stop Filter.

1 Claim 15 (original): The TM microstrip antenna of claim 10
2 wherein said signal input for said feed network comprises a fifty
3 ohm signal input for said feed network.

1 Claim 16 (currently amended): The TM microstrip antenna of
2 claim 10 wherein said first dielectric layer comprises a circuit
3 board and said second dielectric layer comprises a ground board,
4 said circuit board and said ground board each having an overall
5 dimension of 5.7 inches in width and approximately 27 inches in
6 length.

1 Claim 17 (original) A TM microstrip antenna mounted on a

projectile comprising:

(a) a first rectangular shaped dielectric layer;

(b) eight rectangular shaped antenna elements mounted on an upper surface of said first dielectric layer, said eight antenna elements being aligned with one another and fabricated from copper, said eight antenna elements being adapted to transmit telemetry data at a frequency of approximately 2.25 GHz;

(c) each of said eight antenna elements including a tuning stub located on one side of said antenna element, said tuning stub for each of said eight antenna elements allowing said eight antenna elements to be fine tuned to an operating frequency for said TM microstrip antenna;

(d) an antenna feed network mounted on a bottom surface of said first dielectric layer, said antenna feed network having a main transmission line connected to a signal input for said TM microstrip antenna, said feed network having a plurality of branch transmission lines connected to said main transmission line and each of said eight antenna elements, each of said branch transmission lines including a plurality of probes, one of said probes being positioned underneath one antenna element of said eight antenna elements to capacitively couple said one antenna element to said feed network, resulting in a linear polarization

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24 and an omni-directional radiation pattern being generated by said
25 antenna elements of said TM microstrip antenna;

26 (e) a pair of identical band stop filters integrally formed
27 within said main transmission line, each of said pair of band
28 stop filters being tuned at a GPS frequency of approximately
29 1.575 GHz to provide for a minimum isolation of 50 dB; and

30 (h) a second dielectric layer positioned below said first
31 dielectric layer in alignment with said first dielectric layer,
32 said second dielectric layer having a ground plane mounted on a
33 bottom surface thereof.

1 Claim 18 (original): The TM microstrip antenna of claim 17
2 further comprising a continuous gap formed around first, second,
3 third and fourth sides of each of said eight antenna elements,
4 said continuous gap for each of said eight antenna elements
5 having an electric field generated by said antenna element
6 confined to said continuous gap.

1 Claim 19 (original): The TM microstrip antenna of claim 18
2 further comprising a copper plated ground mounted on a remaining
3 portion of the upper surface of said first dielectric layer
4 around the continuous gap for each of said plurality of antenna

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5 elements.

1 Claim 20 (original): The TM microstrip antenna of claim 20
2 wherein said copper plated ground mounted on the upper surface of
3 said first dielectric layer is connected to the ground plane
4 mounted on the bottom surface of said second dielectric layer by
5 a plurality of vias which pass from said copper plated ground
6 through said first dielectric layer and said second dielectric
7 layer to said ground plane.